# IECAG 2024 Conference

## HARNESSING NANOTECHNOLOGY FOR ECO-FRIENDLY VITICULTURE: COMBATING BOTRYTIS CINEREA IN THE RIBERA DE DUERO

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#### Why Use Nanocarriers (NCs)?

- Nanocarriers optimize crop performance while reducing the environmental footprint of food production and plant protection.
- Encapsulating active ingredients in NCs shields plants from the toxic effects of free agrochemicals, enhances absorption due to the improved penetration of nanometric particles through the plant cell wall and cuticle, and minimizes waste and leaching thanks to controlled release properties and the high bioavailability of nanoformulations.

#### **PREVIOUS RESULTS**

#### Lignin-chitosan oligomers (COS) NCs

Patent ES2940132



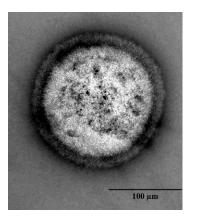
C<sub>3</sub>N<sub>4</sub>-COS NCs Patent PCT/ES2023/070409



#### COS-CMC-Alg NCs

Patent application P202430024

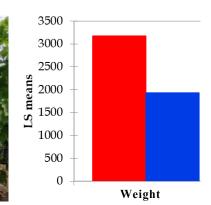




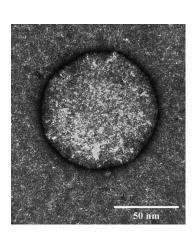


NCs loaded with Rubia tinctorum extract for endotherapy application against grapevine trunk diseases (GTDs).





Reduction of symptoms of grapevine trunk diseases, increased production, absence of phytotoxicity, no alteration of grape quality.

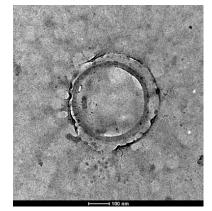


NCs loaded with *R. tinctorum* extract for GTD control in pruning wounds.





Treatment application at 250-750 ppm (left); necrosis lengths in control vs. treated plants (right).

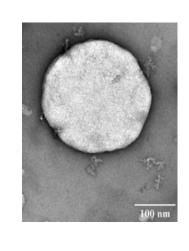




Carvacrol-loaded NCs: high effectiveness for the control of *B. cinerea* in tomato at 100 ppm.









NCs loaded with *Uncaria tomentosa* extract: high effectiveness for the control of *B. cinerea* on strawberries at 500 ppm.

### UVa



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#### GONZÄLEZ BYASS

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## SPRAY APPLICATION FOR THE CONTROL OF B. CINEREA BY SPRAYING







Effective protection against gray rot by  $C_3N_4$ -COS-R. tinctorum NCs (left) and  $C_3N_4$ -COS-HAp-U. tomentosa NCs (center) at 1500 ppm by spray-application on 'Tempranillo' grapes vs. the untreated control (right).